## REMARKS

Status of the Claims

Claims 1–36 remain pending in the application. Claims 1, 16, 18, and 24 presently are amended to clarify the invention as defined in these claims. Claims 1, 16, and 24 have been amended to clarify what is claimed, but none of the changes to the claims in any way relates to the art cited by the Examiner in rejecting the claims. In addition, Claim 18 has been amended to correct a typographical error. Finally, the title of the application has been amended to further clarify the focus of the invention.

Claims Rejected under 35 U.S.C. § 103

The Examiner has rejected Claims 1-36 as being unpatentable under 35 U.S.C. § 103(a) over U.S. Patent No. 6,226,005 to Laferriere ("Laferriere) in view of U.S. Patent No. 5,613,048 to Chen et al. ("Chen"). As stated by the Examiner in the Office Action, Laferriere discloses a method for simulating rendering of a desired graphical effect in an image that, coupled with Chen's recitation of using morph maps, renders the claimed invention obvious.

In the interest of reducing the complexity of the issues for the Examiner to consider in this response, the following discussion focuses on independent Claims 1, 16, and 24. The patentability of each remaining dependent claim is not necessarily separately addressed in detail. However, applicants' decision not to discuss the differences between the cited art and each dependent claim should not be considered as an admission that applicants concur with the Examiner's conclusion that these dependent claims are not patentable over the disclosure in the cited references. Similarly, applicants' decision not to discuss differences between the prior art and every claim element, or every comment made by the Examiner, should not be considered as an admission that applicants concur with the Examiner's interpretation and assertions regarding those claims. Indeed, applicants believe that all of the dependent claims patentably distinguish over the references cited. Moreover, a specific traverse of the rejection of each dependent claim is not required, since dependent claims are patentable for at least the same reasons as the independent claims from which the dependent claims ultimately depend.

The claimed invention, as recited in amended Claim 1, concerns a method for ***simulating a real-time rendering of a desired graphical effect in an image*** of an object constituting a portion of a displayed scene on a display. The real-time rendering is simulated in regard to a single static



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viewpoint. The method includes precomputing data defining a behavior of light rays illuminating the object ***in regard to the single static viewpoint, based on a plurality of input images***. Precomputing the data results in a plurality of morph maps for the object being produced, in which at least one set of pixel-dependent data is associated with each pixel position on the display. Using the morph maps, an image is rendered that simulates real-time rendering of the desired graphical effect in the image of the object. More specifically, ***in response to one of a user action and an event that indicates the desired graphical effect, two-dimensionally, a transformation is performed using the plurality of morph maps to produce an output image that simulates the real-time rendering*** of the desired graphical effect. The output image is then displayed.

Respectfully, Laferriere not only fails to contemplate the use of morph maps in adapting an image, as noted in the Office Action, but also fails to teach or suggest the claimed invention for at least three additional reasons. First, at most, Laferriere teaches a process that may potentially be included within one element of the claimed invention, but Laferriere neither teaches nor suggests the claimed the invention. Laferriere concerns a system and method for ***creating an illumination map that may be used in a rendering engine***. Although Laferriere does discuss illumination (Column 3, lines 5-9) and a camera point of view (Column 5, lines 1-17) as noted by the Examiner, Laferriere teaches how to create an illumination map to be stored with a chosen image so that illumination need not be determined when rendering the image for which the illumination map was created. More specifically, while illumination is described in Laferriere at Column 3, lines 5 - 25, as cited in the Office Action, the illumination is for the purpose of deriving an illumination map:

> According to a first aspect of the present invention, ***there is provided a method of producing an illumination map*** for at least one object in a scene to be rendered, the object to be texture mapped and the object being represented as a mesh of polygons, comprising the steps of:
>
> (i) selecting a texture picture to be mapped to said object and representing said texture picture and said mesh of polygons in a common coordinate system;
>
> (ii) determining the location of, area of and weight of the intersection between each pixel in said texture map and each polygon in said polygon mesh, the weight corresponding to the proportion of said area of intersection relative to the total area of said pixel;
>
> (iii) for each determined area of intersection, ***determining the product of illumination information at said determined location of intersection and the weight of said area of intersection***;



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(iv) ***summing each product determined in step (iii) for each respective pixel to obtain an illumination value***; and

(v) ***storing said illumination value for each said pixel***. (Emphasis added.)

Therefore, the focus of Laferriere is on the creation and storage of an illumination map, or creation of an image texture that includes the effect of illumination information in the image.

By contrast, the precomputation of image maps is only one element of the claimed invention. Claims 1, 16, and 24 all describe precomputing of morph maps; however, the claimed invention includes many other elements that are not cited in this or any other cited reference. Laferriere fails to contemplate, let alone describe, the step of responding to a user action that indicates a graphical effect resulting in the simulation of real-time rendering of an output image to respond to the user action. An illumination map created according to the teachings of Laferriere arguably might be incorporated into the precomputed maps used in the claimed invention, but the combination of Laferriere and Chen neither teaches nor suggests the claimed invention.

Second, because of its emphasis on creating illumination maps, Laferriere teaches away from the claimed invention. At Column 5, lines 1-17 of Laferriere, as cited in the Office Action, Laferriere emphasizes how its illumination maps allow for effects, such as those caused by lighting or illumination, to be ignored during image rendering:

> An illumination map represents the illumination information at points of interest in a scene which is to be rendered, and this illumination map can then be employed by the rendering engine to obtain the final rendered image. ***In such a case, the rendering engine renders the scene without further considering the effect of the light sources defined for the scene on any object for which an illumination map is defined and this results in a less computationally complex rendering and thus a reduced rendering time.***
>
> An illumination map is independent of the camera point of view and therefore, an illumination map determined for an object is useful in rendering that object in any image wherein the light sources or other shade tree components used in determining the illumination map do not change. ***Thus, by employing a predetermined illumination map, the processing time for the rendering engine to subsequently render an image is reduced***, allowing the rendering engine to either process the scene definition faster or to process a more complex scene in a given time. (Emphasis added.)



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In contrast to applicant's claimed invention, Laferriere not only fails to describe how a rendered image might be adapted for illumination according to a user action, but emphasizes that any such adaptations should not be further considered. Thus, Laferriere teaches away from the claimed invention.

Third, Laferriere's focus on development of a single illumination map does not teach or suggest how the claimed invention uses a ***plurality*** of precomputed morph maps to simulate real-time rendering of an object, to respond to a user action. The claimed invention includes a transformation of the plurality of morph maps to respond to a user action without having to re-render the image. The claimed invention's recitation of a plurality of morph maps thus further distinguishes over the applied reference.

Furthermore, Chen fails to make up for Laferriere's failure to teach or disclose the present invention. Chen teaches doing that which the claimed invention specifically seeks to ***avoid***, i.e., real-time re-rendering of an image. As noted in the Office Action, Chen teaches using morphing (Column 4, lines 1-30). However, Chen uses morphing as a way to re-render an image to show the image from different perspectives. Necessarily, morphing an image to account for shifting perspective requires re-rendering of the image. As stated in the present application, re-rendering is precisely what the claimed invention avoids to provide greater efficiency and faster display of an image:

> Indeed, most techniques known in the prior art for rendering an image in real time are either too computationally intensive and thus too slow to implement, or produce artifacts, including incorrect highlights or polygonal silhouettes, leading to unacceptably low-quality rendering, or like the polygon-based 3D rendering approach based upon the z-buffering method, are incomplete solutions to the problem. (See applicant's Background of the Invention, Page 2, lines 29-35.)

As recited in Claims 1, 16, and 24, the claimed invention ***simulates*** real-time rendering of the image, and thereby avoids the computational burdens and delays involved in re-rendering an image. Therefore, Chen does not teach the shortcomings of Laferriere, as would be required for the combination of these two references to cause the present claimed invention to be obvious. In addition, because of the nature of Chen's morphing and real-time rendering of the image, as well as its focus on three-dimensional aspects of an image, it would not be obvious to attempt to combine Chen with Laferriere to achieve applicant's claimed invention.



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In the interest of clarifying the claimed invention, and not in response to the art cited, applicant has amended Claims 1, 16, and 24, as well as the title of the application, to emphasize that the claimed invention ***simulates*** real-time rendering of a desired graphical effect in an image of an object constituting a portion of a displayed scene. With this addition, applicant hopes to underscore that the claimed invention concerns simulating real-time rendering of an image in response to a user action, without incurring the burdens of actually re-rendering the image.

Applicant again notes that each dependent Claim is patentable for at least the same reasons as the independent Claim from which it ultimately depends. Accordingly, each of the dependent Claims that have not been specifically discussed above are patentable for the reasons set forth in regard to the independent Claims in this case.

In consideration of the preceding remarks and the amendments to the Claims, it should be apparent that all Claims in the application define novel and nonobvious subject matter. Accordingly, applicant requests that the Examiner pass this case to issue without further delay. In the event that any further questions remain, the Examiner is invited to telephone applicant's attorney at the number listed below.

Respectfully submitted,

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MAILING CERTIFICATE

I hereby certify that this correspondence is being deposited with the U.S. Postal Service in a sealed envelope as first class mail with postage thereon fully prepaid addressed to: Commissioner for Patents, Alexandria, VA 22313-1450, on May 10, 2005.

Date: May 10, 2005



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